This week's PubMed 28th November - 4th December 2021: articles of interest n = 40

CPR AND COVID-19

1. Am J Emerg Med. 2021 Nov 15;52:34-42. doi: 10.1016/j.ajem.2021.11.017. Online ahead of print.
Attitudes among healthcare professionals towards cardiopulmonary resuscitation during COVID-19.
Al-Shiakh S(1), Tran QK(2), Caggiula A(3), Berezowski I(3), Barnawi B(4), Pourmand A(5).
ABSTRACT
BACKGROUND: Out-of-hospital cardiac arrests (OHCAs) are a leading cause of mortality in the United States. The ongoing COVID-19 pandemic has dramatically altered the landscape of response to OHCAs, particularly with regard to providing cardiopulmonary resuscitation (CPR). We aimed to describe, characterize, and address the attitudes and concerns of healthcare workers towards CPR of OHCA patients during the COVID-19 pandemic. METHODS: We performed a cross-sectional study of healthcare workers and trainees in the United States and Saudi Arabia via an online survey available between October 2020, and May 2021. The primary outcome of interest was willingness to perform CPR for OHCA, with confidence to handle CPR for OHCA as our secondary outcome. RESULTS: A total of 501 healthcare professionals, including 436 (87%) with background in emergency medicine, participated in our survey. 331 (66%) reported being willing to perform CPR for OHCA, while 170 (34%) were not willing. 311 (94%) willing participants stated that their medical oath and moral responsibility were the main motivators for willingness, while a fear of contracting COVID-19 was the primary demotivating factor for 126 (74%) unwilling participants. Time series analysis with simple exponential smoothing showed an increase in willingness to perform CPR from 30% to 50%, as well as an increase in mean confidence level to perform CPR from 60% to 70%, between October 2020 and May 2021. CONCLUSIONS: The ongoing COVID-19 pandemic significantly affected healthcare workers' attitudes towards performing CPR for OHCA. Confidence levels and willingness to perform CPR increased over time during the study period. Efforts should be directed towards the creation of standardized and evidence-based guidelines for CPR during COVID-19, as well as increasing knowledge regarding risks of infection and effective use of PPE during resuscitation.

2. BMJ Open. 2021 Nov 30;11(11):e054943. doi: 10.1136/bmjopen-2021-054943.
Cohort study of the characteristics and outcomes in patients with COVID-19 and in-hospital cardiac arrest.
Holm A(1), Jerkeman M(2), Sultanian P(2), Lundgren P(2)(3), Ravn-Fischer A(2), Israelsson J(3)(4), Giesecke J(5), Herlitz J(6), Rawshani A(2).
ABSTRACT
OBJECTIVE: We studied characteristics, survival, causes of cardiac arrest, conditions preceding cardiac arrest, predictors of survival and trends in the prevalence of COVID-19 among in-hospital cardiac arrest (IHCA) cases. DESIGN AND SETTING: Registry-based observational study. PARTICIPANTS: We studied all cases (≥18 years of age) of IHCA receiving cardiopulmonary resuscitation in the Swedish Registry for Cardiopulmonary Resuscitation during 15 March 2020 to 31 December 2020. A total of 1613 patients were included and divided into the following groups: ongoing infection (COVID-19+; n=182), no infection (COVID-19-; n=1062) and unknown/not assessed (n=369). MAIN OUTCOMES AND MEASURES: We studied monthly trends in proportions of COVID-19 associated IHCAs, causes of IHCA in relation to COVID-19 status, clinical conditions preceding the cardiac arrest and predictors of survival. RESULTS: The rate of COVID-19+ patients suffering an IHCA increased to 23% during the first pandemic wave (April), then abated to 3% in July, and then increased to 19% during the second wave (December). Among COVID-19+ cases, 43% had

respiratory insufficiency or infection as the underlying cause of the cardiac arrest, compared with 18% among COVID-19- cases. The most common clinical sign preceding cardiac arrest was hypoxia (57%) among COVID-19+ cases. OR for 30-day survival for COVID-19+ cases was 0.50 (95% CI 0.33 to 0.76), compared with COVID-19- cases. CONCLUSION: During pandemic peaks, up to one-fourth of all IHCAs are complicated by COVID-19, and these patients have halved chance of survival, with women displaying the worst outcomes.

3. Resuscitation. 2021 Nov 24:S0300-9572(21)00479-2. doi: 10.1016/j.resuscitation.2021.11.025. Online ahead of print.

Impact of the Three COVID-19 Surges in 2020 on In-Hospital Cardiac Arrest Survival in the United States.

Gupta K(1), Girotra S(2), Nallamothu BK(3), Kennedy K(4), Starks MA(5), Chan PS(6); American Heart Association's Get With the Guidelines®-Resuscitation Investigators listed in SupplementaryAppendix.

ABSTRACT

BACKGROUND: Studies have reported lower survival for in-hospital cardiac arrest (IHCA) during the initial COVID-19 surge. Whether the pandemic reduced IHCA survival during subsequent surges and in areas with lower COVID-19 rates is unknown. METHODS: Within Get-With-The-Guidelines®-Resuscitation, we identified 22,899 and 79,736 IHCAs during March to December in 2020 and 2015-2019, respectively. Using hierarchical regression, we compared risk-adjusted rates of survival to discharge in 2020 vs. 2015-19 during five COVID-19 periods: Surge 1 (March to mid-May), post-Surge 1 (mid-May to June), Surge 2 (July to mid-August), post-Surge 2 (mid-August to mid-October), and Surge 3 (mid-October to December). Monthly COVID-19 mortality rates for each hospital's county were categorized, per 1,000,000 residents, as very low (0-10), low (11-50), moderate (51-100), or high (>100). RESULTS: During each COVID-19 surge period in 2020, rates of survival to discharge for IHCA were lower, as compared with the same period in 2015-2019: Surge 1: adjusted OR: 0.81 (0.75-0.88); Surge 2: adjusted OR: 0.88 (0.79-0.97), Surge 3: adjusted OR: 0.79 (0.73-0.86). Lower survival was most pronounced at hospitals located in counties with moderate to high monthly COVID-19 mortality rates. In contrast, during the two post-surge periods, survival rates were similar in 2020 vs. 2015-2019: post-Surge 1: adjusted OR 0.93 (0.83-1.04) and post-Surge 2: adjusted OR 0.94 (0.86-1.03), even at hospitals with the highest county-level COVID-19 mortality rates. CONCLUSIONS: During the three COVID-19 surges in the U.S. during 2020, rates of survival to discharge for IHCA dropped substantially, especially in communities with moderate to high COVID-19 mortality rates.

CPR/MECHANICAL CHEST COMPRESSION

1. J Am Heart Assoc. 2021 Dec 2:e021090. doi: 10.1161/JAHA.121.021090. Online ahead of print.

Effect of Acute Exposure to Altitude on the Quality of Chest Compression-Only Cardiopulmonary Resuscitation in Helicopter Emergency Medical Services Personnel: A Randomized, Controlled, Single-Blind Crossover Trial.

Vögele A(1), van Veelen MJ(1), Dal Cappello T(1), Falla M(1)(2), Nicoletto G(1), Dejaco A(1)(3), Palma M(1), Hüfner K(4), Brugger H(1)(5), Strapazzon G(1)(5).

ABSTRACT

Background Helicopter emergency medical services personnel operating in mountainous terrain are frequently exposed to rapid ascents and provide cardiopulmonary resuscitation (CPR) in the field. The aim of the present trial was to investigate the quality of chest compression only (CCO)-CPR after acute exposure to altitude under repeatable and standardized conditions. Methods and Results Forty-eight helicopter emergency medical services personnel were divided into 12 groups of 4 participants; each group was assigned to perform 5 minutes of CCO-CPR on manikins at 2 of 3

altitudes in a randomized controlled single-blind crossover design (200, 3000, and 5000 m) in a hypobaric chamber. Physiological parameters were continuously monitored; participants rated their performance and effort on visual analog scales. Generalized estimating equations were performed for variables of CPR quality (depth, rate, recoil, and effective chest compressions) and effects of time, altitude, carryover, altitude sequence, sex, qualification, weight, preacclimatization, and interactions were analyzed. Our trial showed a time-dependent decrease in chest compression depth (P=0.036) after 20 minutes at altitude; chest compression depth was below the recommended minimum of 50 mm after 60 to 90 seconds (49 [95% CI, 46-52] mm) of CCO-CPR. Conclusions This trial showed a time-dependent decrease in CCO-CPR quality provided by helicopter emergency medical services personnel during acute exposure to altitude, which was not perceived by the providers. Our findings suggest a reevaluation of the CPR guidelines for providers practicing at altitudes of 3000 m and higher. Mechanical CPR devices could be of help in overcoming CCO-CPR quality decrease in helicopter emergency medical services missions.

REGISTRIES, REVIEWS AND EDITORIALS

1. BMC Public Health. 2021 Dec 2;21(1):2202. doi: 10.1186/s12889-021-12269-4.
A national population-based study of patients, bystanders and contextual factors associated with resuscitation in witnessed cardiac arrest: insight from the french RéAC registry.
Reuter PG(1)(2)(3), Baert V(4)(5), Colineaux H(6), Escutnaire J(4), Javaud N(7), Delpierre C(6), Adnet F(8), Loeb T(9), Charpentier S(10)(6), Lapostolle F(8), Hubert H(4)(5), Lamy S(6)(11).
ABSTRACT
BACKGROUND: In out-of-hospital cardiac arrest (OHCA), bystander initiated cardiopulmonary resuscitation (CPR) increases the chance of return of spontaneous circulation and survival with a favourable neurological status. Socioeconomic disparities have been highlighted in OHCA field. In areas with the lowest average socioeconomic status, OHCA incidence increased, and bystander CPR decreased. Evaluations were performed on restricted geographical area, and European evaluation is lacking. We aimed to analyse, at a national level, the impact of area-level social deprivation on the initiation of CPR in case of a witnessed OHCA. METHODS: We included all witnessed OHCA cases with age over 18 years from July 2011 to July 2018 form the OHCA French national registry. We excluded OHCA occurred in front of rescue teams or in nursing home, and patients with incomplete address or partial geocoding. We collected data from context, bystander and patient. The area-level social deprivation was estimated by the French version of the European Deprivation Index (in quintile) associated with the place where OHCA occurred. We assessed the associations between Utstein variables and social deprivation level using a mixed-effect logit model with bystander-initiated CPR. RESULTS: We included 23,979 witnessed OHCA of which 12,299 (51%) had a bystander-initiated CPR. More than one third of the OHCA (8,326 (35%)) occurred in an area from the highest quintile of social deprivation. The higher the area-level deprivation, the less the proportion of bystander-initiated CPR (56% in Quintile 1 versus 48% in Quintile 5). The In the multivariable analysis, bystander less often began CPR in areas with the highest deprivation level, compared to those with the lowest deprivation level (OR=0.69, IC95%: 0.63-0.75). CONCLUSIONS: The level of social deprivation of the area where OHCA occurred was associated with bystander-initiated CPR. It decreased in the more deprived areas although these areas also concentrate more younger patients.

2. BMC Emerg Med. 2021 Dec 3;21(1):151. doi: 10.1186/s12873-021-00546-9.
Intravenous infusion route in maternal resuscitation: a scoping review.

Nakamura E(1)(2), Takahashi S(3)(4), Matsunaga S(3)(5), Tanaka H(3)(6), Furuta M(3)(7), Sakurai A(3)(8); Japan Resuscitation Council (JRC), Guideline Editorial Committee.

ABSTRACT

BACKGROUND: The concept that upper extremities can be used as an infusion route during cardiopulmonary resuscitation in pregnant women is a reasonable recommendation considering the characteristic circulation of pregnant women; however, this method is not based on scientific evidence. OBJECTIVE OF THE REVIEW: We conducted a scoping review to determine whether the infusion route should be established above the diaphragm during cardiopulmonary resuscitation in a pregnant woman. DISCUSSION: We included randomized controlled trials (RCTs) and non-RCTs on the infusion of fluids in pregnant women after 20 weeks of gestation requiring establishment of an infusion route due to cardiac arrest, massive bleeding, intra-abdominal bleeding, cesarean section, severe infection, or thrombosis. In total, 3150 articles from electronic database were extracted, respectively. After title and abstract review, 265 articles were extracted, and 116 articles were extracted by full-text screening, which were included in the final analysis. The 116 articles included 78 studies on infusion for pregnant women. The location of the intravenous infusion route could be confirmed in only 17 studies, all of which used the upper extremity to secure the venous route. CONCLUSION: Pregnant women undergo significant physiological changes that differ from those of normal adults, because of pressure and drainage of the inferior vena cava and pelvic veins by the enlarged uterus. Therefore, despite a lack of evidence, it seems logical to secure the infusion route above the diaphragm when resuscitating a pregnant woman.

IN-HOSPITAL CARDIAC ARREST

1. J Crit Care. 2021 Nov 29;68:22-30. doi: 10.1016/j.jcrc.2021.11.008. Online ahead of print.

In-depth assessment of health-related quality of life after in-hospital cardiac arrest.

Schluep M(1), Endeman H(2), Gravesteijn BY(3), Kuijs C(4), Blans MJ(5), van den Bogaard B(6), Van Gemert AWMMK(7), Hukshorn CJ(8), van der Meer BJM(9), Knook AHM(10), van Melsen T(11), Peters R(12), Simons KS(13), Spijkers G(14), Vermeijden JW(15), Wils EJ(16), Stolker RJ(3), Hoeks SE(3).

ABSTRACT

INTRODUCTION: Evidence on physical and psychological well-being of in-hospital cardiac arrest (IHCA) survivors is scarce. The aim of this study is to describe long-term health-related quality of life (HRQoL), functional independence and psychological distress 3 and 12 months post-IHCA. METHODS: A multicenter prospective cohort study in 25 hospitals between January 2017 - May 2018. Adult IHCA survivors were included. HRQoL (EQ-5D-5L, SF-12), psychological distress (HADS, CSI) and functional independence (mRS) were assessed at 3 and 12 months post-IHCA. RESULTS: At 3-month follow-up 136 of 212 survivors responded to the questionnaire and at 12 months 110 of 198 responded. The median (IQR) EQ-utility Index score was 0.77 (0.65-0.87) at 3 months and 0.81 (0.70-0.91) at 12 months. At 3 months, patients reported a median SF-12 (IQR) physical component scale (PCS) of 38.9 (32.8-46.5) and mental component scale (MCS) of 43.5 (34.0-39.7) and at 12 months a PCS of 43.1 (34.6-52.3) and MCS 46.9 (38.5-54.5). DISCUSSION: Using various tools most IHCA survivors report an acceptable HRQoL and a substantial part experiences lower HRQoL compared to population norms. Our data suggest that younger (male) patients and those with poor functional status prior to admission are at highest risk of impaired HRQoL.

2. J Am Heart Assoc. 2021 Dec 2:e021572. doi: 10.1161/JAHA.121.021572. Online ahead of print.

Temporal Trends in Characteristics and Outcomes Associated With In-Hospital Cardiac Arrest: A 20-Year Analysis (1999-2018).

Wu L(1), Narasimhan B(1), Bhatia K(1), Ho KS(1), Krittanawong C(2), Aronow WS(3), Lam P(1), Virani SS(2), Pamboukian SV(4).

ABSTRACT

Background Despite advances in resuscitation medicine, the burden of in-hospital cardiac arrest (IHCA) remains substantial. The impact of these advances and changes in resuscitation guidelines on IHCA survival remains poorly defined. To better characterize evolving patient characteristics and temporal trends in the nature and outcomes of IHCA, we undertook a 20-year analysis of a national database. Methods and Results We analyzed the National Inpatient Sample (1999-2018) using International Classification of Diseases, Ninth Revision and Tenth Revision, Clinical Modification (ICD-9-CM and ICD-10-CM) codes to identify all adult patients suffering IHCA. Subgroup analysis was performed based on the type of cardiac arrest (ie, ventricular tachycardia/ventricular fibrillation or pulseless electrical activity-asystole). An age- and sex-adjusted model and a multivariable risk-adjusted model were used to adjust for potential confounders. Over the 20-year study period, a steady increase in rates of IHCA was observed, predominantly driven by pulseless electrical activity-asystole arrest. Overall, survival rates increased by over 10% after adjusting for risk factors. In recent years (2014-2018), a similar trend toward improved survival is noted, though this only achieved statistical significance in the pulseless electrical activity-asystole cohort. Conclusions Though the ideal quality metric in IHCA is meaningful neurological recovery, survival is the first step toward this. As overall IHCA rates rise, overall survival rates are improving in tandem. However, in more recent years, these improvements have plateaued, especially in the realm of ventricular tachycardia/ ventricular fibrillation-related survival. Future work is needed to better identify characteristics of IHCA nonsurvivors to improve resource allocation and health care policy in this area.

3. PLoS One. 2021 Nov 29;16(11):e0259698. doi: 10.1371/journal.pone.0259698. eCollection 2021.

Impact of chronic obstructive pulmonary disease on survival and neurologic outcomes in adults with in-hospital cardiac arrest.

Qadeer A(1), Parikh PB(1), Ramkishun CA(1), Tai J(1), Patel JK(1).

ABSTRACT

BACKGROUND: Little data exists regarding the association of chronic obstructive pulmonary disease (COPD) on outcomes in the setting of in-hospital cardiac arrest (IHCA). We sought to assess the impact of COPD on mortality and neurologic outcomes in adults with IHCA. METHODS: The study population included 593 consecutive hospitalized patients with IHCA undergoing ACLS-guided resuscitation at an academic tertiary medical center from 2012-2018. The primary and secondary outcomes of interest were survival to discharge and favorable neurological outcome (defined as a Glasgow Outcome Score of 4-5) respectively. RESULTS: Of the 593 patients studied, 162 (27.3%) had COPD while 431 (72.7%) did not. Patients with COPD were older, more often female, and had higher Charlson Comorbidity score. Location of cardiac arrest, initial rhythm, duration of cardiopulmonary resuscitation, and rates of defibrillation and return of spontaneous circulation were similar in both groups. Patients with COPD had significantly lower rates of survival to discharge (10.5% vs 21.6%, p = 0.002) and favorable neurologic outcomes (7.4% vs 15.9%, p = 0.007). In multivariable analyses, COPD was independently associated with lower rates of survival to discharge [odds ratio (OR) 0.54, 95% confidence interval (CI) 0.30-0.98, p = 0.041]. CONCLUSIONS: In this contemporary prospective registry of adults with IHCA, COPD was independently associated with significantly lower rates of survival to discharge.

4. Clin Nurse Spec. 2022 Jan-Feb 01;36(1):29-44. doi: 10.1097/NUR.0000000000000644.

Accuracy of Machine Learning Models to Predict In-hospital Cardiac Arrest: A Systematic Review.

Moffat LM(1), Xu D.

ABSTRACT

PURPOSE/AIMS: Despite advances in healthcare, the incidence of in-hospital cardiac arrest (IHCA) has continued to rise for the past decade. Identifying those patients at risk has proven challenging.

Our objective was to conduct a systematic review of the literature to compare the IHCA predictive performance of machine learning (ML) models with the Modified Early Warning Score (MEWS). DESIGN: The systematic review was conducted following the Preferred Reporting Items of Systematic Review and Meta-Analysis guidelines and registered on PROSPERO CRD42020182357. METHOD: Data extraction was completed using the Critical Appraisal and Data Extraction for Systematic Reviews of Prediction Modeling Studies checklist. The risk of bias and applicability were evaluated using the Prediction model Risk of Bias Assessment Tool. RESULTS: Nine articles were included in this review that developed or validated IHCA prediction models and compared them with the MEWS. The studies by Jang et al and Kim et al showed that their ML models outperformed MEWS to predict IHCA with good to excellent predictive performance. CONCLUSIONS: The ML models presented in this systematic review demonstrate a novel approach to predicting IHCA. All included studies suggest that ML models had similar or better predictive performance compared with MEWS. However, there is substantial variability in performance measures and concerns for risk of bias.

INJURIES AND CPR

No articles identified.

CAUSE OF THE ARREST

1. J Am Heart Assoc. 2021 Dec 2:e021827. doi: 10.1161/JAHA.121.021827. Online ahead of print.
Contacts With the Health Care System Before Out-of-Hospital Cardiac Arrest.
Zylyftari N(1)(2), Møller SG(1), Wissenberg M(1)(3), Folke F(1)(3), Barcella CA(1), Møller AL(2), Gnesin F(2), Mills EHA(4), Jensen B(5), Lee CJ(1)(2), Tan HL(6)(7), Køber L(8), Lippert F(3), Gislason GH(1)(9), Torp-Pedersen C(2)(4); ESCAPE-NET Investigators.

ABSTRACT

Background It remains challenging to identify patients at risk of out-of-hospital cardiac arrest (OHCA). We aimed to examine health care contacts in patients before OHCA compared with the general population that did not experience an OHCA. Methods and Results Patients with OHCA with a presumed cardiac cause were identified from the Danish Cardiac Arrest Registry (2001-2014) and their health care contacts (general practitioner [GP]/hospital) were examined up to 1 year before OHCA. In a case-control study (1:9), OHCA contacts were compared with an age- and sex-matched background population. Separately, patients with OHCA were examined by the contact type (GP/hospital/both/no contact) within 2 weeks before OHCA. We included 28 955 patients with OHCA. The weekly percentages of patient contacts with GP the year before OHCA were constant (25%) until 1 week before OHCA when they markedly increased (42%). Weekly percentages of patient contacts with hospitals the year before OHCA gradually increased during the last 6 months (3.5%-6.6%), peaking at the second week (6.8%) before OHCA; mostly attributable to cardiovascular diseases (21%). In comparison, there were fewer weekly contacts among controls with 13% for GP and 2% for hospital contacts (P<0.001). Within 2 weeks before OHCA, 57.8% of patients with OHCA had a health care contact, and these patients had more contacts with GP (odds ratio [OR], 3.17; 95% CI, 3.09-3.26) and hospital (OR, 2.32; 95% CI, 2.21-2.43) compared with controls. Conclusions The health care contacts of patients with OHCA nearly doubled leading up to the OHCA event, with more than half of patients having health care contacts within 2 weeks before arrest. This could have implications for future preventive strategies.

2. Br J Sports Med. 2021 Dec 1:bjsports-2021-104623. doi: 10.1136/bjsports-2021-104623. Online ahead of print.

Bystander interventions and survival after exercise-related sudden cardiac arrest: a systematic review.

Grubic N(1)(2), Hill B(2), Phelan D(3), Baggish A(4), Dorian P(5), Johri AM(2).

ABSTRACT

OBJECTIVE: To evaluate the provision of bystander interventions and rates of survival after exercise-related sudden cardiac arrest (SCA). DESIGN: Systematic review. DATA SOURCES: MEDLINE, EMBASE, PubMed, CINAHL, SPORTDiscus, Cochrane Library and grey literature sources were searched from inception to November/December 2020. STUDY ELIGIBILITY CRITERIA: Observational studies assessing a population of exercise-related SCA (out-of-hospital cardiac arrests that occurred during exercise or within 1 hour of cessation of activity), where bystander cardiopulmonary resuscitation (CPR) and/or automated external defibrillator (AED) use were reported, and survival outcomes were ascertained. METHODS: Among all included studies, the median (IQR) proportions of bystander CPR and bystander AED use, as well as median (IQR) rate of survival to hospital discharge, were calculated. RESULTS: A total of 29 studies were included in this review, with a median study duration of 78.7 months and a median sample size of 91. Most exercise-related SCA patients were male (median: 92%, IQR: 86%-96%), middle-aged (median: 51, IQR: 39-56 years), and presented with a shockable arrest rhythm (median: 78%, IQR: 62%-86%). Bystander CPR was initiated in a median of 71% (IQR: 59%-87%) of arrests, whereas bystander AED use occurred in a median of 31% (IQR: 19%-42%) of arrests. Among the 19 studies that reported survival to hospital discharge, the median rate of survival was 32% (IQR: 24%-49%). Studies which evaluated the relationship between bystander interventions and survival outcomes reported that both bystander CPR and AED use were associated with survival after exercise-related SCA. CONCLUSION: Exercise-related SCA occurs predominantly in males and presents with a shockable ventricular arrhythmia in most cases, emphasising the importance of rapid access to defibrillation. Further efforts are needed to promote early recognition and a rapid bystander response to exercise-related SCA.

3. Saudi Med J. 2021 Dec;42(12):1320-1324. doi: 10.15537/smj.2021.42.12.20210478.

Outcomes of cirrhotic patients admitted to the intensive care unit after a successful cardiac arrest resuscitation.

Alkhlewi MN(1), Al-Dorzi HM(1), Alenezi FZ(1), Farhat AM(1), Tamim H(1), Sadat M(1), Humaid FB(1), Arabi YM(1).

ABSTRACT

OBJECTIVES: To evaluate the outcomes of cirrhotic patients admitted to the intensive care unit (ICU) following cardiac arrest. METHODS: This was a single centre retrospective study of all the cirrhotic patients, admitted to the ICU at King Abdulaziz Medical City, Riyadh, Saudi Arabia, after a successful cardiac arrest resuscitation, from 1999 to 2017. The characteristics of the hospital survivors and non-survivors were compared. RESULTS: A total of 76 patients were admitted to the ICU during the study period, with a median age of 64 years. In addition to cirrhosis, the patients had other chronic comorbidities, including chronic renal disease (32.9%) and diabetes (47%). Of this group, 67 (88.2%) died in the hospital, and 54 (71%) died while in ICU. Compared to the group who survived, all non-survivors required mechanical ventilation and had a higher median APACHE II score of 38 (p=0.006), a lower median Glasgow coma score (GCS) of 3 (p=0.0003), and a higher median lactic acid of 6.4 mmol/L (p=0.032). On multivariable logistic regression analysis, the important predictors of hospital mortality were APACHE II score (p=0.006), bilirubin level (p=0.008) and GCS (p=0.005). CONCLUSION: Cirrhotic patients admitted to the ICU following cardiac arrest have high mortality. Patients with higher APACHE II scores, higher bilirubin and lower GCS have higher risk of in-hospital mortality.

4. Am J Cardiovasc Dis. 2021 Oct 25;11(5):576-586. eCollection 2021.

Trends and differences in management and outcomes of cardiac arrest in underweight and obese acute myocardial infarction hospitalizations.

Patlolla SH(1), Ya'Qoub L(2), Prasitlumkum N(3), Sundaragiri PR(4), Cheungpasitporn W(5), Doshi RP(6), Rab ST(7), Vallabhajosyula S(7).

ABSTRACT

The influence of weight on in-hospital events of acute myocardial infarction complicated with cardiac arrest (AMI-CA) is understudied. To address this, we utilized the National Inpatient Sample database (2008-2017) to identify adult AMI-CA admissions and categorized them by BMI into underweight, normal weight, and overweight/obese groups. The outcomes of interest included differences in in-hospital mortality, use of invasive therapies, hospitalization costs, and hospital length of stay across the three weight categories. Of the 314,609 AMI-CA admissions during the study period, 268,764 (85.4%) were normal weight, 1,791 (0.6%) were underweight, and 44,053 (14.0%) were overweight/obese. Compared to 2008, in 2017, adjusted temporal trends revealed significant increase in prevalence of AMI-CA in underweight (adjusted OR {aOR} 3.88 [95% CI 3.04-4.94], P<0.001) category, and overweight/obese AMI-CA admissions (aOR 2.67 [95% CI 2.53-2.81], P<0.001). AMI-CA admissions that were underweight were older, more often female, with greater comorbidity burden, and presented more often with non-ST-segment-elevation AMI, non-shockable rhythm, and in-hospital arrest. Overweight/obesity was associated with higher use of angiography, PCI, and greater need for mechanical circulatory support whereas underweight status had the lowest use of these procedures. Compared to normal weight AMI-CA admissions, underweight admissions had comparable adjusted in-hospital mortality (adjusted OR 0.97 [95% CI 0.87-1.09], P=0.64) whereas overweight/obese admissions had lower in-hospital mortality (adjusted OR 0.92 [95% CI 0.90-0.95], P<0.001). In conclusion, underweight AMI-CA admissions were associated with lower use of cardiac procedures and had in-hospital mortality comparable to normal weight admissions. Overweight/obese status was associated with higher rates of cardiac procedures and lower in-hospital mortality.

END-TIDAL CO_2

1. Sci Rep. 2021 Nov 30;11(1):23165. doi: 10.1038/s41598-021-02764-4.

Dynamic changes in arterial blood gas during cardiopulmonary resuscitation in out-of-hospital cardiac arrest.

Hong SI(1), Kim JS(1), Kim YJ(1), Kim WY(2).

ABSTRACT

We aimed to investigate the prognostic value of dynamic changes in arterial blood gas analysis (ABGA) measured after the start of cardiopulmonary resuscitation (CPR) for return of spontaneous circulation (ROSC) in patients with out-of-hospital cardiac arrest (OHCA). This prospective observational study was conducted at the emergency department of a university hospital from February 2018 to February 2020. All blood samples for gas analysis were collected from a radial or femoral arterial line, which was inserted during CPR. Changes in ABGA parameters were expressed as delta (Δ), defined as the values of the second ABGA minus the values of the initial ABGA. The primary outcome was sustained ROSC. Out of the 80 patients included in the analysis, 13 achieved sustained ROSC after in-hospital resuscitation. Multivariable logistic analysis revealed that ΔpaO2 (odds ratio [OR] = 1.023; 95% confidence interval [CI] = 1.004-1.043, p = 0.020) along with prehospital shockable rhythm (OR = 84.680; 95% CI = 2.561-2799.939, p = 0.013) and total resuscitation duration (OR = 0.881; 95% CI = 0.805-0.964, p = 0.006) were significant predictors for

sustained ROSC. Our study suggests a possible association between ΔpaO2 in ABGA during CPR and an increased rate of sustained ROSC in the late phase of OHCA.

ORGAN DONATION

No articles identified.

FEEDBACK

No articles identified.

DRUGS

1. JAMA. 2021 Nov 30. doi: 10.1001/jama.2021.20929. Online ahead of print.
Effect of Intravenous or Intraosseous Calcium vs Saline on Return of Spontaneous Circulation in Adults With Out-of-Hospital Cardiac Arrest: A Randomized Clinical Trial.
Vallentin MF(1), Granfeldt A(2), Meilandt C(1), Povlsen AL(1), Sindberg B(3)(4), Holmberg MJ(3)(4)(5), Iversen BN(1)(2), Mærkedahl R(1)(6), Mortensen LR(1)(7), Nyboe R(1)(8), Vandborg MP(1)(9), Tarpgaard M(1)(6), Runge C(1)(10), Christiansen CF(11), Dissing TH(1)(2), Terkelsen CJ(12), Christensen S(2), Kirkegaard H(1)(3)(4), Andersen LW(1)(2)(3)(4).
ABSTRACT
IMPORTANCE: It is unclear whether administration of calcium has a beneficial effect in patients with cardiac arrest. OBJECTIVE: To determine whether administration of calcium during out-of-hospital cardiac arrest improves return of spontaneous circulation in adults. DESIGN, SETTING, AND PARTICIPANTS: This double-blind, placebo-controlled randomized clinical trial included 397 adult patients with out-of-hospital cardiac arrest and was conducted in the Central Denmark Region between January 20, 2020, and April 15, 2021. The last 90-day follow-up was on July 15, 2021. INTERVENTIONS: The intervention consisted of up to 2 intravenous or intraosseous doses with 5 mmol of calcium chloride (n = 197) or saline (n = 200). The first dose was administered immediately after the first dose of epinephrine. MAIN OUTCOMES AND MEASURES: The primary outcome was sustained return of spontaneous circulation. The secondary outcomes included survival and a favorable neurological outcome (modified Rankin Scale score of 0-3) at 30 days and 90 days. RESULTS: Based on a planned interim analysis of 383 patients, the steering committee stopped the trial early due to concerns about harm in the calcium group. Of 397 adult patients randomized, 391 were included in the analyses (193 in the calcium group and 198 in the saline group; mean age, 68 [SD, 14] years; 114 [29%] were female). There was no loss to follow-up. There were 37 patients (19%) in the calcium group who had sustained return of spontaneous circulation compared with 53 patients (27%) in the saline group (risk ratio, 0.72 [95% CI, 0.49 to 1.03]; risk difference, -7.6% [95% CI, -16% to 0.8%]; P = .09). At 30 days, 10 patients (5.2%) in the calcium group and 18 patients (9.1%) in the saline group were alive (risk ratio, 0.57 [95% CI, 0.27 to 1.18]; risk difference, -3.9% [95% CI, -9.4% to 1.3%]; P = .17). A favorable neurological outcome at 30 days was observed in 7 patients (3.6%) in the calcium group and in 15 patients (7.6%) in the saline group (risk ratio, 0.48 [95% CI, 0.20 to 1.12]; risk difference, -4.0% [95% CI, -8.9% to 0.7%]; P = .12). Among the patients with calcium values measured who had return of spontaneous circulation, 26 (74%) in the calcium group and 1 (2%) in the saline group had hypercalcemia. CONCLUSIONS AND RELEVANCE: Among adults with out-of-hospital cardiac arrest, treatment with intravenous or intraosseous calcium compared

with saline did not significantly improve sustained return of spontaneous circulation. These results do not support the administration of calcium during out-of-hospital cardiac arrest in adults.

2. BMC Emerg Med. 2021 Dec 3;21(1):151. doi: 10.1186/s12873-021-00546-9.
Intravenous infusion route in maternal resuscitation: a scoping review.
Nakamura E(1)(2), Takahashi S(3)(4), Matsunaga S(3)(5), Tanaka H(3)(6), Furuta M(3)(7), Sakurai A(3)(8); Japan Resuscitation Council (JRC), Guideline Editorial Committee.
ABSTRACT
BACKGROUND: The concept that upper extremities can be used as an infusion route during cardiopulmonary resuscitation in pregnant women is a reasonable recommendation considering the characteristic circulation of pregnant women; however, this method is not based on scientific evidence. OBJECTIVE OF THE REVIEW: We conducted a scoping review to determine whether the infusion route should be established above the diaphragm during cardiopulmonary resuscitation in a pregnant woman. DISCUSSION: We included randomized controlled trials (RCTs) and non-RCTs on the infusion of fluids in pregnant women after 20 weeks of gestation requiring establishment of an infusion route due to cardiac arrest, massive bleeding, intra-abdominal bleeding, cesarean section, severe infection, or thrombosis. In total, 3150 articles from electronic database were extracted, respectively. After title and abstract review, 265 articles were extracted, and 116 articles were extracted by full-text screening, which were included in the final analysis. The 116 articles included 78 studies on infusion for pregnant women. The location of the intravenous infusion route could be confirmed in only 17 studies, all of which used the upper extremity to secure the venous route. CONCLUSION: Pregnant women undergo significant physiological changes that differ from those of normal adults, because of pressure and drainage of the inferior vena cava and pelvic veins by the enlarged uterus. Therefore, despite a lack of evidence, it seems logical to secure the infusion route above the diaphragm when resuscitating a pregnant woman.

TRAUMA

1. R I Med J (2013). 2021 Dec 1;104(10):31-35.
Impact of Direct Transport vs. Transfer on Out-of-Hospital Traumatic Cardiac Arrest.
Martin TJ(1), Stephen AH(1), Adams CA(1), Lueckel SN(1), Kheirbek T(1).
ABSTRACT
BACKGROUND: Injured patients benefit from direct transport to a trauma center; however, it is unknown whether patients with traumatic out-of-hospital cardiac arrest (OHCA) benefit from initial resuscitation at the nearest emergency department (ED) if a trauma center is farther away. We hypothesized that patients with traumatic OHCA transported directly to a trauma center have less in-hospital mortality after initial resuscitation compared to those transferred from non-trauma centers. METHODS: We examined patients presenting with traumatic OHCA within our institutional trauma registry and the National Trauma Data Bank (NTDB) and excluded patients with ED mortality. Our primary outcome was all-cause mortality during index hospitalization; multiple logistic regression controlled for age, sex, injury severity score, mechanism of injury, signs of life, emergency surgery, and level I trauma center designation. RESULTS: We identified 271 and 1,138 adult patients with traumatic OHCA in our registry and the NTDB; 28% and 16% were transferred from another facility, respectively. Following initial resuscitation, patients transferred to a trauma center had higher in-hospital mortality than those transported directly in both our local and national cohorts (aOR: 2.27, 95%CI: 1.03-4.98, and aOR: 2.66, 95%CI: 1.35 - 5.26, respectively). DISCUSSION: Patients with traumatic OHCA transported directly to a trauma center may have increased survival to discharge compared to those transferred from another facility, even accounting for initial

resuscitation. Further investigation should examine the impact of both physiologic and logistic factors including distance to trauma center, traffic, and weather patterns that may impact prehospital decision-making and destination selection.

2. Ann N Y Acad Sci. 2021 Dec 2. doi: 10.1111/nyas.14725. Online ahead of print.
Emergency preservation and resuscitation for cardiac arrest from trauma.
Tisherman SA(1).
ABSTRACT
Patients who suffer a cardiac arrest from trauma rarely survive. Surgical control of hemorrhage cannot be obtained in time to prevent irreversible organ damage. Emergency preservation and resuscitation (EPR) was developed to utilize hypothermia to buy time to achieve hemostasis and allow delayed resuscitation. Large animal studies have demonstrated that cooling to tympanic membrane temperature 10 °C during exsanguination cardiac arrest can allow up to 2 h of circulatory arrest and repair of simulated injuries with normal neurologic recovery. The Emergency Preservation and Resuscitation for Cardiac Arrest from Trauma (EPR-CAT) trial is testing the feasibility and safety of initiating EPR. Study subjects include patients with penetrating trauma who lose a pulse within 5 minutes of hospital arrival and remain pulseless despite standard care. EPR is initiated via an intra-aortic flush of ice-cold saline solution. Following hemostasis, delayed resuscitation and rewarming are accomplished with cardiopulmonary bypass. The primary outcome is survival to hospital discharge without significant neurologic deficits. If trained team members are available, subjects can undergo EPR. If not, subjects can be enrolled as concurrent controls. Ten EPR and 10 control subjects will be enrolled. If successful, EPR could save the lives of trauma patients who are currently dying from exsanguinating hemorrhage.

VENTILATION

No articles identified.

CERERBRAL MONITORING

No articles identified.

ULTRASOUND AND CPR

1. Ultrasound J. 2021 Dec 2;13(1):46. doi: 10.1186/s13089-021-00248-0.
Point-of-care ultrasound in cardiorespiratory arrest (POCUS-CA): narrative review article.
Ávila-Reyes D(1), Acevedo-Cardona AO(2)(3), Gómez-González JF(4)(5), Echeverry-Piedrahita DR(4), Aguirre-Flórez M(6), Giraldo-Diaconeasa A(6).
ABSTRACT
The POCUS-CA (Point-of-care ultrasound in cardiac arrest) is a diagnostic tool in the Intensive Care Unit and Emergency Department setting. The literature indicates that in the patient in a cardiorespiratory arrest it can provide information of the etiology of the arrest in patients with non-defibrillable rhythms, assess the quality of compressions during cardiopulmonary resuscitation (CPR), and define prognosis of survival according to specific findings and, thus, assist the clinician in decision-making during resuscitation. This narrative review of the literature aims to expose the usefulness of ultrasound in the setting of cardiorespiratory arrest as a tool that allows making a rapid diagnosis and making decisions about reversible causes of this entity. More studies are needed

to support the evidence to make ultrasound part of the resuscitation algorithms. Teamwork during cardiopulmonary resuscitation and the inclusion of ultrasound in a multidisciplinary approach is important to achieve a favorable clinical outcome.

ORGANISATION AND TRAINING

1. Resuscitation. 2021 Nov 26:S0300-9572(21)00483-4. doi: 10.1016/j.resuscitation.2021.11.029. Online ahead of print.

Development and validation of the SARICA Score to predict Survival After Return of spontaneous circulation in out of hospital Cardiac Arrest using an interpretable machine learning framework.

Yi Wong X(1), Kai Ang Y(2), Li K(3), Han Chin Y(4), Shao Wei Lam S(5), Boon Kiat Tan K(6), Chin Heng Chua M(3), Eng Hock Ong M(7), Liu N(8), Reza Pourghaderi A(9), Fu Wah Ho A(10).

ABSTRACT

BACKGROUND: Accurate and timely prognostication of patients with out-of-hospital cardiac arrest (OHCA) who achieved the return of spontaneous circulation (ROSC) is crucial in clinical decision-making, resource allocation, and communications with next-of-kins. We aimed to develop the Survival After ROSC in Cardiac Arrest (SARICA), a practical clinical decision tool to predict survival in OHCA patients who attained ROSC. METHODS: We utilized real-world Singapore data from the population-based Pan-Asian Resuscitation Outcomes Study between 2010-2018. We excluded patients without ROSC. The dataset was segmented into training (60%), validation (20%) and testing (20%) cohorts. The primary endpoint was survival (to 30-days or hospital discharge). AutoScore, an interpretable machine-learning based clinical score generation algorithm, was used to develop SARICA. Candidate factors were chosen based on objective demographic and clinical factors commonly available at the time of admission. Performance of SARICA was evaluated based on receiver-operating curve (ROC) analyses. RESULTS: 5970 patients were included, of which 855 (14.3%) survived. A three-variable model was determined to be most parsimonious. Prehospital ROSC, age, and initial heart rhythm were identified for inclusion via random forest selection. Finally, SARICA consisted of these 3 variables and ranged from 0 to 10 points, achieving an area under the ROC (AUC) of 0.87 (95% confidence interval: 0.84-0.90) within the testing cohort. CONCLUSION: We developed and internally validated the SARICA score to accurately predict survival of OHCA patients with ROSC at the time of admission. SARICA is clinically practical and developed using an interpretable machine-learning framework. SARICA has unknown generalizability pending external validation studies.

2. Resusc Plus. 2021 Nov 18;8:100173. doi: 10.1016/j.resplu.2021.100173. eCollection 2021 Dec.

Features of Emergency Medical System calls that facilitate or inhibit Emergency Medical Dispatcher recognition that a patient is in, or at imminent risk of, cardiac arrest: A systematic mixed studies review.

Kirby K(1)(2), Voss S(2), Bird E(2), Benger J(2).

ABSTRACT

AIM: To identify and appraise evidence relating to the features of an Emergency Medicine System call interaction that enable, or inhibit, an Emergency Medical Dispatcher's recognition that a patient is in out-of-hospital cardiac arrest, or at imminent risk of out-of-hospital cardiac arrest. METHODS: All study designs were eligible for inclusion. Data sources included Medline, BNI, CINAHL, EMBASE, PubMed, Cochrane Database of Systematic Reviews, AMED and OpenGrey. Stakeholder resources were screened and experts in resuscitation were asked to review the studies identified. Studies were

appraised using the Mixed Methods Appraisal Tool. Synthesis was completed using a segregated mixed research synthesis approach. RESULTS: Thirty-two studies were included in the review. Three main themes were identified: Key features of the Emergency Medical Service call interaction; Managing the Emergency Medical Service call; Emotional distress. CONCLUSION: A dominant finding is the difficulty in recognising abnormal/agonal breathing during the Emergency Medical Service call. The interaction between the caller and the Emergency Medical Dispatcher is critical in the recognition of patients who suffer an out-of-hospital cardiac arrest. Emergency Medical Dispatchers adapt their approach to the Emergency Medical Service call, and regular training for Emergency Medical Dispatchers is recommended to optimise out-of-hospital cardiac arrest recognition. Further research is required with a focus on the Emergency Medical Service call interaction of patients who are alive at the time of the Emergency Medical Service call and who later deteriorate into OHCA.

3. Crit Care. 2021 Nov 27;25(1):408. doi: 10.1186/s13054-021-03825-w.
Dispatcher instructions for bystander cardiopulmonary resuscitation and neurologically intact survival after bystander-witnessed out-of-hospital cardiac arrests: a nationwide, population-based observational study.
Goto Y(1), Funada A(2), Maeda T(3), Goto Y(4).
ABSTRACT
BACKGROUND: The International Liaison Committee on Resuscitation recommends that dispatchers provide instructions to perform compression-only cardiopulmonary resuscitation (CPR) to callers responding to adults with out-of-hospital cardiac arrest (OHCA). This study aimed to determine the optimal dispatcher-assisted CPR (DA-CPR) instructions for OHCA. METHODS: We analysed the records of 24,947 adult patients (aged ≥ 18 years) who received bystander DA-CPR after bystander-witnessed OHCA. Data were obtained from a prospectively recorded Japanese nationwide Utstein-style database for a 2-year period (2016-2017). Patients were divided into compression-only DA-CPR (n = 22,778) and conventional DA-CPR (with a compression-to-ventilation ratio of 30:2, n = 2169) groups. The primary outcome measure was 1-month neurological intact survival, defined as a cerebral performance category score of 1-2 (CPC 1-2). RESULTS: The 1-month CPC 1-2 rate was significantly higher in the conventional DA-CPR group than in the compression-only DA-CPR group (before propensity score (PS) matching, 7.5% [162/2169] versus 5.8% [1309/22778], $p < 0.01$; after PS matching, 7.5% (162/2169) versus 5.7% (123/2169), $p < 0.05$). Compared with compression-only DA-CPR, conventional DA-CPR was associated with increased odds of 1-month CPC 1-2 (before PS matching, adjusted odds ratio 1.39, 95% confidence interval [CI] 1.14-1.70, $p < 0.01$; after PS matching, adjusted odds ratio 1.34, 95% CI 1.00-1.79, $p < 0.05$). CONCLUSION: Within the limitations of this retrospective observational study, conventional DA-CPR with a compression-to-ventilation ratio of 30:2 was preferable to compression-only DA-CPR as an optimal DA-CPR instruction for coaching callers to perform bystander CPR for adult patients with bystander-witnessed OHCAs.

4. Eur J Anaesthesiol. 2021 Dec 1. doi: 10.1097/EJA.0000000000001643. Online ahead of print.
Facilitators and barriers for the implementation of resuscitation training programmes for schoolchildren: A systematic review.
Wingen S(1), Jeck J, Schroeder DC, Wingen-Heimann SM, Drost RMWA, Böttiger BW.
ABSTRACT
BACKGROUND: Training schoolchildren in resuscitation seems to improve rates of resuscitation by bystanders. Leading medical societies recommend comprehensive resuscitation education in schools. To date, no widespread implementation within the European Union has happened. OBJECTIVE: The study aim was to identify facilitators and barriers for the implementation of cardiopulmonary resuscitation training for schoolchildren within the European Union. DESIGN:

Systematic review. DATA SOURCES: A literature search in PubMed was conducted between 1 January 1999 and 30 June 2020 in accordance with the PRISMA statement. The search terms 'resuscitation', 'children' and 'Europe' were combined with the Boolean Operator 'AND' and 'OR'. Medical subject heading terms were used in order to include relevant articles. ELIGIBILITY CRITERIA: Articles were included if cardiopulmonary resuscitation training specifically tailored for school-children aged 12 to 18 years was considered in countries of the European Union. Articles that fulfilled the following criteria were excluded: duplicates, training methods only for specific patient groups, articles not accessible in the English language, and articles that did not include original data. Findings were structured by an evidence-based six-level approach to examine barriers and facilitators in healthcare. RESULTS: Thirty out of 2005 articles were identified. Large variations in cardiopulmonary resuscitation training approaches ranging from conventional to innovative training methods can be observed. Schoolteachers as resuscitation instructors act either as barrier or facilitator depending on their personal attitude and their exposure to training in resuscitation. Cardiopulmonary resuscitation training in schoolchildren is effective. The uncoordinated interplay between the generally motivated schools and the political orientation towards resuscitation training for schoolchildren serve as barrier. The lack of financial support, absent systematic organisation and standardisation of training create major barriers. CONCLUSION: Training schoolchildren in cardiopulmonary resuscitation is effective. More financial support and political guidance is needed. Until then, local initiatives, motivated teachers, and dedicated principles combined with innovative and low-cost training methods facilitate cardiopulmonary resuscitation training in schools.

5. BMJ Open. 2021 Nov 30;11(11):e052478. doi: 10.1136/bmjopen-2021-052478.

Training frequency for educating schoolchildren in basic life support: very brief 4-month rolling-refreshers versus annual retraining-a 2-year prospective longitudinal trial.

Abelairas-Gómez C(1)(2)(3), Martinez-Isasi S(4)(3)(5), Barcala-Furelos R(6)(7), Varela-Casal C(6)(7), Carballo-Fazanes A(1)(3)(5), Pichel-López M(6), Fernández Méndez F(6), Otero-Agra M(6), Sanchez Santos L(8), Rodriguez-Nuñez A(1)(3)(5)(9).

ABSTRACT

OBJECTIVE: To compare the effectiveness of 4-month rolling-refreshers and annual retraining in basic life support (BLS) on a sample of schoolchildren. DESIGN: Prospective longitudinal trial. SETTING AND PARTICIPANTS: Four hundred and seventy-two schoolchildren (8-12years old). INTERVENTIONS: Schoolchildren were instructed in BLS and then split into the following three groups: control group (CG), standard group (SG) and rolling-refresher group (RRG). Their BLS skills were assessed within 1 week (T1) and 2 years later (T2). Moreover, CG did not receive any additional training; SG received one 50 min retraining session 1 year later; RRG participated in very brief (5 min) rolling-refreshers that were carried out every 4 months. PRIMARY AND SECONDARY OUTCOMES: Hands-on skills of BLS sequence and cardiopulmonary resuscitation. RESULTS: BLS sequence performance was similar in all groups at T1, but SG and RRG followed the steps of the protocol in more proportion than CG at T2. When compared at T2, RRG showed higher proficiency than SG in checking safety, checking response, opening the airway and alerting emergency medical services. In addition, although the mean resuscitation quality was low in all groups, RRG participants reached a higher percentage of global quality cardiopulmonary resuscitation (CG: 16.4±24.1; SG: 25.3±28.8; RRG: 29.9%±29.4%), with a higher percentage of correct chest compressions by depth (CG: 3.9±11.8; SG: 10.8±22.7; RRG: 15.5±26.1 mm). CONCLUSIONS: In 8-to-12-year-old schoolchildren, although annual 50 min retraining sessions help to maintain BLS performance, 4-month very brief rolling-refreshers were shown to be even more effective. Thus, we recommend implementing baseline BLS training at schools, with subsequently brief rolling-refreshers.

POST-CARDIAC ARREST TREATMENTS

1. Expert Rev Cardiovasc Ther. 2021 Dec 3. doi: 10.1080/14779072.2021.2013815. Online ahead of print.

Coronary angiography following out-of-hospital cardiac arrest (OHCA): a review of outcomes and clinical considerations.

Udi J(1)(2), Sekandarzad A(1)(2), Supady A(1)(2)(3), Biever P(1)(2), Bode C(1)(2), Zehender M(1)(2), Busch HJ(4), Wengenmayer T(1)(2), Staudacher DL(1)(2), Duerschmied D(1)(2).

ABSTRACT

INTRODUCTION: In patients suffering a sudden out-of-hospital cardiac arrest (OHCA), the prevalence of a coronary artery lesion as the underlying cause is relatively high, but many other causes have been described. For this reason, identifying patients who would benefit from an emergency coronary angiography is important. AREAS COVERED: In the present manuscript, we reviewed the literature covering some relevant studies regarding the role of coronary angiography in patients with OHCA, including our local algorithm for the management of patients with OHCA. We particularly focused on the selection of patients who would benefit from an emergency coronary angiography, the time period until the performance of the angiography, the role of extracorporeal cardiopulmonary resuscitation (ECPR), the identification of a coronary artery lesion as the underlying cause of cardiac arrest and clinical outcomes. EXPERT OPINION: In summary, a local standard algorithm for the management of patients with OHCA appears favorable. An emergency coronary angiography should be advised in patients with a presumed cardiac cause and without obvious non-cardiac cause. A shockable initial rhythm, ST elevation in the post-resuscitation ECG, a previously known coronary artery disease, and ECPR are important predictors of cardiac cause of OHCA.

2. G Ital Cardiol (Rome). 2021 Dec;22(12):984-986. doi: 10.1714/3698.36876.

[The TOMAHAWK trial: not always rushing to coronary angiography in comatose patients resuscitated after out-of-hospital cardiac arrest without ST-segment elevation]. [Article in Italian]

Bugani G(1), Casella G(1).

NO ABSTRACT AVAILABLE

3. Cardiovasc Revasc Med. 2021 Nov 26:S1553-8389(21)00753-3. doi: 10.1016/j.carrev.2021.11.026. Online ahead of print.

Timing of coronary angiography in patients following out-of-hospital cardiac arrest without ST-segment elevation: A systematic review and Meta-analysis of randomized trials.

Abusnina W(1), Al-Abdouh A(2), Latif A(1), Alkhouli M(3), Alraies MC(4), Daggubati R(5), Alasnag M(6), Kerrigan J(7), Paul TK(8).

ABSTRACT

INTRODUCTION: Out-of-hospital cardiac arrest (OHCA) has a poor prognosis. The timing and role of early coronary angiography (CAG) in OHCA patients without ST elevation remains unclear. OBJECTIVE: We performed a meta-analysis of randomized controlled trials (RCTs) that compared early CAG to delayed CAG in OHCA patients without ST elevation. METHODS: We searched PubMed, Cochrane, and ClinicalTrials.gov databases (from inception to September 2021) for studies comparing early CAG to delayed CAG in OHCA patients without ST elevation. We used a random-effect model to calculate relative ratio (RR) with 95% confidence interval (CI). The primary outcome was all-cause mortality at 30 days. Secondary outcomes included neurological status with cerebral performance category ≤2 (CPC) and the rate of percutaneous coronary intervention (PCI) following CAG. RESULTS: A total of 6 RCTs including 1822 patients, of whom 895 underwent early CAG, and 927 underwent delayed CAG, were included in this meta-analysis. There was no statistically significant difference between the 2 groups in terms of 30-day all-cause mortality (Relative risk [RR] 1.06; 95%CI 0.94-1.20; P = 0.32; I2 = 13%), neurological status (CPC ≤2) (RR 1.01; 95%CI 0.90-1.13; P = 0.85, I2 = 37%), and rates of PCI following CAG (RR 1.08; 95%CI 0.84-1.39; P = 0.56; I2 = 49%).

CONCLUSION: In patients suffering OHCA without ST-elevation, early CAG is not associated with reduced 30-day mortality when compared to patients who underwent delayed CAG. Given our meta-analysis results including multiple trials that have not shown a benefit, it is likely that updated guidelines will not support early angiography in patients suffering OHCA without ST-elevation.

4. Resuscitation. 2021 Nov 24:S0300-9572(21)00480-9. doi: 10.1016/j.resuscitation.2021.11.026. Online ahead of print.

The inflammatory response is related to circulatory failure after out-of-hospital cardiac arrest: a prospective cohort study.

Langeland H(1), Kristian Damås J(2), Eirik Mollnes T(3), Krey Ludviksen J(4), Ueland T(5), Michelsen AE(6), Løberg M(7), Bergum D(8), Nordseth T(9), Kristian Skjærvold N(10), Klepstad P(10).

ABSTRACT

BACKGROUND: Whole body ischemia and reperfusion injury after cardiac arrest leads to the massive inflammation clinically manifested in the post-cardiac arrest syndrome. Previous studies on the inflammatory effect on circulatory failure after cardiac arrest have either investigated a selected patient group or a limited part of the inflammatory mechanisms. We examined the association between cardiac arrest characteristics and inflammatory biomarkers, and between inflammatory biomarkers and circulatory failure after cardiac arrest, in an unselected patient cohort. METHODS: This was a prospective study of 50 consecutive patients with out-of-hospital cardiac arrest. Circulation was invasively monitored from admission until day five, whereas inflammatory biomarkers, i.e. complement activation, cytokines and endothelial injury, were measured daily. We identified predictors for an increased inflammatory response, and associations between the inflammatory response and circulatory failure. RESULTS: We found a marked and broad inflammatory response in patients after cardiac arrest, which was associated with clinical outcome. Long time to return of spontaneous circulation and high lactate level at admission were associated with increased complement activation (TCC and C3bc), pro-inflammatory cytokines (IL-6, IL-8) and endothelial injury (syndecan-1) at admission. These biomarkers were in turn significantly associated with lower mean arterial blood pressure, lower cardiac output and lower systemic vascular resistance, and increased need of circulatory support in the initial phase. High levels of TCC and IL-6 at admission were significantly associated with increased 30-days mortality. CONCLUSION: Inflammatory biomarkers, including complement activation, cytokines and endothelial injury, were associated with increased circulatory failure in the initial period after cardiac arrest.

TARGETED TEMPERATURE MANAGEMENT

1. Resuscitation. 2021 Nov 27:S0300-9572(21)00485-8. doi: 10.1016/j.resuscitation.2021.11.031. Online ahead of print.

Feasibility of early waking cardiac arrest patients whilst receiving therapeutic hypothermia: The therapeutic hypothermia and early waking (THAW) trial.

Watson N(1), Karamasis G(2), Stathogiannis K(1), Potter M(1), Damian M(1), Cook C(2), Pottinger R(3), Clesham G(2), Gamma R(1), Aggarwal R(1), Sayer J(1), Robinson N(1), Jagathesan R(1), Kabir A(1), Tang K(1), Kelly P(1), Maccaroni M(1), Kadayam R(1), Nalgirkar R(1), Namjoshi G(1), Urovi S(1), Pai A(1), Waghmare K(1), Caruso V(1), Polderman K(4), Noc M(5), Davies JR(2), Keeble TR(2).

ABSTRACT

AIM: To determine the safety and feasibility of an early (12 hours) waking and extubation protocol for out-of-hospital cardiac arrest (OHCA) patients receiving targeted temperature management (TTM). METHODS: This was a single-centre, prospective, non-randomised, observational, safety and feasibility pilot study which included successfully resuscitated OHCA patients, of presumed cardiac cause. Inclusion criteria were: OHCA patients aged over 18 years with a return of spontaneous circulation, who were going to receive TTM33 (TTM at 33°C for 24 hours and prevention of

hyperthermia for 72 hours) as part of their post cardiac arrest care. Clinical stability was measured against physiological and neurological parameters as well as clinical assessment. RESULTS: 50 consecutive patients were included (median age 65.5 years, 82% male) in the study. Four (8%) patients died within the first twelve hours and were excluded from the final cohort (n=46). Twenty-three patients (46%) were considered clinically stable and suitable for early waking based on the intention to treat analysis; 12 patients were extubated early based on a variety of clinical factors (21.4 ± 8.6 hours) whilst continuing to receive TTM33 with a mean core temperature of 34.2°C when extubated. Of these, five patients were discharged from the intensive care unit (ICU) <48 hours after admission with a mean ICU length of stay 1.8 ± 0.4 days. Twenty-eight patients (56%) were discharged from the ICU with a modified Rankin Score of 0-2. The overall intra-hospital mortality was 50% (n=25). CONCLUSIONS: It is safe and feasible to wake selected comatose OHCA patients at 12 hours, allowing for earlier positive neuro-prognostication and reduced ICU stay.

ELECTROPHYSIOLOGY AND DEFIBRILLATION

No articles identified.

PEDIATRICS AND CHILDREN

1. Pediatr Cardiol. 2021 Dec 2. doi: 10.1007/s00246-021-02781-0. Online ahead of print.
A "Good Death" for Children with Cardiac Disease.
Moynihan KM(#)(1)(2), Ziniel SI(#)(3), Johnston E(4), Morell E(5), Pituch K(6), Blume ED(7)(8).
ABSTRACT
Children with heart disease often experience symptoms and medically intense end-of-life care. Our study explored bereaved parents' perceptions of a "good death" via a mail survey to 128 parents of children with heart disease who died in two centers. Parental perceptions of end-of-life circumstances were assessed by closed-ended questions including level of agreement with the question: "would you say your child experienced a good death?" and open-ended comments were contributed. Medical therapies at end-of-life and mode of death were retrieved through chart review. Of 50 responding parents, 44 (response rate: 34%) responded to the "good death" question; 16 (36%) agreed strongly, 15 (34%) agreed somewhat, and 30% disagreed (somewhat: 7, 16%; strongly: 6, 14%). Half the children were on mechanical support and 84% intubated at death. Of children with cardiopulmonary resuscitation (CPR) at end-of-life, 71% of parents disagreed with the "good death" question compared with 22% of parents whose child died following discontinuation of life-sustaining therapy or comfort measures (OR 9.1, 95% CI 1.3, 48.9, $p < 0.01$). Parent-reported circumstances associated with disagreement with the "good death" question included cure-oriented goals-of-care (OR 16.6, 95% CI 3.0, 87.8, $p < 0.001$), lack of advance care planning (ACP) (OR 12.4 95% CI 2.1, 65.3 $p < 0.002$), surprise regarding timing of death (OR 11.7, 95% CI 2.6, 53.4 $p < 0.002$), and experience of pain (OR 42.1, 95% CI 2.3, 773.7 $p < 0.02$). Despite high medical intensity, many bereaved parents of children with cardiac disease agree a "good death" was experienced. A "good death" was associated with greater preparedness, ACP, non-cure-oriented goals-of-care, pain control, and CPR avoidance.

2. Crit Care Nurse. 2021 Dec 1;41(6):22-27. doi: 10.4037/ccn2021339.
NRP Versus PALS for Infants Outside the Delivery Room: Not If, but When?
Doroba JE(1).
ABSTRACT

BACKGROUND: Both the Neonatal Resuscitation Program and Pediatric Advanced Life Support guidelines can be used for infants requiring cardiopulmonary resuscitation outside the delivery room. Each set of guidelines has supporting algorithms for resuscitation; however, there are no current recommendations for transitioning older infants outside the delivery room. OBJECTIVE: To provide background information on the algorithms in the Neonatal Resuscitation Program and Pediatric Advanced Life Support guidelines and to discuss the role that nurses and advanced practice nurses play in advancing scientific research on resuscitation. CONTENT COVERED: Summaries of both sets of guidelines, differences in practices, and recommendations for practice changes will be discussed. DISCUSSION: Provider preference and unit practice determine which guidelines are used for infants outside the delivery room. Providers in pediatric intensive care units and pediatric cardiac intensive care units often use the Pediatric Advanced Life Support guidelines, whereas providers in neonatal intensive care units use the Neonatal Resuscitation Program guidelines for infants of the same age. The variation in resuscitation practices for infants outside the delivery room can negatively affect resuscitation outcomes.

EXTRACORPOREAL LIFE SUPPORT

1. ASAIO J. 2021 Dec 1. doi: 10.1097/MAT.0000000000001613. Online ahead of print.
Survival and Factors Associated with Survival with Extracorporeal Life Support During Cardiac Arrest: A Systematic Review and Meta-Analysis.
Panagides V(1), Laine M, Fond G, Lebreton G, Paganelli F, Michelet P, Roch A, Boyer L, Bonello L.
ABSTRACT
The survival rate after cardiac arrest (CA) remains low. The utilization of extracorporeal life support is proposed to improve management. However, this resource-intensive tool is associated with complications and must be used in selected patients. We performed a meta-analysis to determine predictive factors of survival. Among the 81 studies included, involving 9256 patients, survival was 26.2% at discharge and 20.4% with a good neurologic outcome. Meta-regressions identified an association between survival at discharge and lower lactate values, intrahospital CA, and lower cardio pulmonary resuscitation (CPR) duration. After adjustment for age, intrahospital CA, and mean CPR duration, an initial shockable rhythm was the only remaining factor associated with survival to discharge (β = 0.02, 95% CI: 0.007-0.02; p = 0.0004).

2. ASAIO J. 2021 Dec 1. doi: 10.1097/MAT.0000000000001620. Online ahead of print.
Predictors of Favorable Neurologic Outcomes in a Territory-First Extracorporeal Cardiopulmonary Resuscitation Program.
Ng PY(1), Li ACC, Fang S, Lin JCR, Ip A, Chan WM, Sin WC, Ngai CW.
ABSTRACT
Extracorporeal cardiopulmonary resuscitation (ECPR) is an advanced resuscitation method that has been associated with better outcomes after cardiac arrest compared with conventional cardiopulmonary resuscitation. This is a retrospective analysis of all patients who received ECPR for cardiac arrest in Hong Kong's first ECPR program from 2012 to 2020. The primary outcome was favorable neurologic outcome at 3 months. A new risk prediction model was developed and its performance was compared with published risk scores. One-hundred two patients received ECPR and 19 (18.6%) patients survived with favorable neurologic outcome. Having a shockable rhythm was the strongest predictor of favorable neurologic outcome in multivariate analysis (odds ratio, 9.64; 95% confidence interval [CI], 1.49 to 62.30; P = 0.017). We developed a simple model with three parameters for the prediction of favorable neurologic outcomes - presence of shockable rhythm, mean arterial pressure after extracorporeal membrane oxygenation, and the Acute Physiology And Chronic Health Evaluation IV score, with an area under receiver operating

characteristic curve of 0.85 (95% CI, 0.77 to 0.94). In Hong Kong's first ECPR program, 18.6% patients survived with favorable neurologic outcomes, and having a shockable rhythm at presentation was the strongest predictor. Risk scores are useful in predicting important patient outcomes and should be included in clinical decision-making for patients who received ECPR.

EXPERIMENTAL RESEARCH

1. J Am Heart Assoc. 2021 Dec 2:e022679. doi: 10.1161/JAHA.121.022679. Online ahead of print.
Cardiac Arrest in Pigs With 48 hours of Post-Resuscitation Care Induced by 2 Methods of Myocardial Infarction: A Methodological Description.
Vammen L(1)(2), Munch Johannsen C(1)(2), Magnussen A(2), Povlsen A(2)(3), Riis Petersen S(2), Azizi A(2), Løfgren B(2)(4)(5), Andersen LW(1)(2)(4)(6), Granfeldt A(1)(2).
ABSTRACT
Background Systematic reviews have disclosed a lack of clinically relevant cardiac arrest animal models. The aim of this study was to develop a cardiac arrest model in pigs encompassing relevant cardiac arrest characteristics and clinically relevant post-resuscitation care. Methods and Results We used 2 methods of myocardial infarction in conjunction with cardiac arrest. One group (n=7) had a continuous coronary occlusion, while another group (n=11) underwent balloon-deflation during arrest and resuscitation with re-inflation after return of spontaneous circulation. A sham group was included (n=6). All groups underwent 48 hours of intensive care including 24 hours of targeted temperature management. Pigs underwent invasive hemodynamic monitoring. Left ventricular function was assessed by pressure-volume measurements. The proportion of pigs with return of spontaneous circulation was 43% in the continuous infarction group and 64% in the deflation-reinflation group. In the continuous infarction group 29% survived the entire protocol while 55% survived in the deflation-reinflation group. Both cardiac arrest groups needed vasopressor and inotropic support and pressure-volume measurements showed cardiac dysfunction. During rewarming, systemic vascular resistance decreased in both cardiac arrest groups. Median [25%;75%] troponin-I 48 hours after return of spontaneous circulation, was 88 973 ng/L [53 124;99 740] in the continuous infarction group, 19 661 ng/L [10 871;23 209] in the deflation-reinflation group, and 1973 ng/L [1117;1995] in the sham group. Conclusions This article describes a cardiac arrest pig model with myocardial infarction, targeted temperature management, and clinically relevant post-cardiac arrest care. We demonstrate 2 methods of inducing myocardial ischemia with cardiac arrest resulting in post-cardiac arrest organ injury including cardiac dysfunction and cerebral injury.

2. Arch Dis Child Fetal Neonatal Ed. 2021 Nov 29:fetalneonatal-2021-322881. doi: 10.1136/archdischild-2021-322881. Online ahead of print.
Single versus continuous sustained inflations during chest compressions and physiological-based cord clamping in asystolic lambs.
Schmölzer GM(1), Roberts CT(2), Blank DA(3)(4), Badurdeen S(5), Miller SL(6), Crossley KJ(7), Stojanovska V(6), Galinsky R(6), Kluckow M(8), Gill AW(9), Hooper SB(4)(10)(11), Polglase GR(12)(13).
ABSTRACT
BACKGROUND: The feasibility and benefits of continuous sustained inflations (SIs) during chest compressions (CCs) during delayed cord clamping (physiological-based cord clamping; PBCC) are not known. We aimed to determine whether continuous SIs during CCs would reduce the time to return of spontaneous circulation (ROSC) and improve post-asphyxial blood pressures and flows in asystolic newborn lambs. METHODS: Fetal sheep were surgically instrumented immediately prior to delivery at ~139 days' gestation and asphyxia induced until lambs reached asystole. Lambs were randomised to either immediate cord clamping (ICC) or PBCC. Lambs then received a single SI (SIsing; 30 s at 30

cmH2O) followed by intermittent positive pressure ventilation, or continuous SIs (SIcont: 30 s duration with 1 s break). We thus examined 4 groups: ICC +SIsing, ICC +SIcont, PBCC +SIsing, and PBCC +SIcont. Chest compressions and epinephrine administration followed international guidelines. PBCC lambs underwent cord clamping 10 min after ROSC. Physiological and oxygenation variables were measured throughout. RESULTS: The time taken to achieve ROSC was not different between groups (mean (SD) 4.3±2.9 min). Mean and diastolic blood pressure was higher during chest compressions in PBCC lambs compared with ICC lambs, but no effect of SIs was observed. SIcont significantly reduced pulmonary blood flow, diastolic blood pressure and oxygenation after ROSC compared with SIsing. CONCLUSION: We found no significant benefit of SIcont over SIsing during CPR on the time to ROSC or on post-ROSC haemodynamics, but did demonstrate the feasibility of continuous SIs during advanced CPR on an intact umbilical cord. Longer-term studies are recommended before this technique is used routinely in clinical practice.

3. Adv Exp Med Biol. 2021;1269:C1. doi: 10.1007/978-3-030-48238-1_63.
Retraction Note to: Effect of Adrenaline on Cerebral Blood Oxygenation Measured by NIRS in a Rat Asphyxia Cardiac Arrest Model.
Okuma Y(1), Yagi T(2), Yin T(2), Kiguchi T(3), Iwami T(3), Becker LB(2), Shinozaki K(2).
NO ABSTRACT AVAILABLE

CASE REPORTS

1. Case Rep Cardiol. 2021 Nov 18;2021:9083144. doi: 10.1155/2021/9083144. eCollection 2021.
Sudden Cardiac Death: The Most Feared but Potentially Preventable Presentation of Wolff-Parkinson-White Syndrome.
Pereira AR(1), Briosa A(1), Miranda R(1), Almeida SS(1), Brandão L(1), Pereira H(1).
ABSTRACT
Background. Wolff-Parkinson-White syndrome is an uncommon cardiac disorder characterized by the presence of one or more accessory pathways that predispose patients to frequent episodes of arrhythmias. The prognosis is usually good, but there is a lifetime risk of malignant arrhythmias and sudden cardiac death. Case Summary. A 25-year-old male presented a witnessed out-of-hospital cardiac arrest with ventricular fibrillation rhythm. Due to rapid initiation of prehospital advanced life support, return of spontaneous circulation was observed. During the transport to the hospital, an irregular wide complex tachycardia suggestive of preexcited atrial fibrillation with haemodynamic instability was also observed and a synchronized shock was applied. Baseline 12-lead electrocardiogram was compatible with sinus rhythm and ventricular preexcitation pattern. After clinical stabilization, an electrophysiological study was performed confirming the presence of a left anterolateral accessory pathway with a short antegrade effective refractory period. Successful radiofrequency catheter ablation was achieved. Discussion. The reported clinical case recalls fundamental features of the Wolff-Parkinson-White syndrome and outlines the increasing evidence and importance of the invasive risk stratification and even catheter ablation in asymptomatic patients who suffer from this uncommon disease that may have a dramatic and fatal initial clinical manifestation.

2. J Innov Card Rhythm Manag. 2021 Nov 15;12(11):4756-4760. doi: 10.19102/icrm.2021.121102. eCollection 2021 Nov.
Ventricular Fibrillation Cardiopulmonary Arrest Following Micra™ Leadless Pacemaker Implantation.
Ahmad H(1), Brar V(2), Butt N(1), Chetram V(2), Worley SJ(2), O'Donoghue S(2).

ABSTRACT
Leadless cardiac pacemakers such as the Micra™ transcatheter leadless pacing system (Medtronic, Minneapolis, MN, USA) are an alternative to traditional transvenous pacemakers. Implantation of leadless pacemakers, albeit safe, may be associated with complications, including cardiac tamponade; high capture thresholds; and, rarely, ventricular arrhythmias. We report a case of ventricular fibrillation arrest following the implantation of a Micra™ leadless pacemaker.

3. Cureus. 2021 Oct 25;13(10):e19030. doi: 10.7759/cureus.19030. eCollection 2021 Oct.
ST Depression in the Setting of Subarachnoid Hemorrhage.
Mustafa A(1), Hitt N(1), Smirlis E(1), Koranne K(2).
ABSTRACT
We present a case report of a patient presenting with subarachnoid hemorrhage whose electrocardiogram (ECG) mimicked non-ST-elevation myocardial infarction. A 36-year-old male with a past medical history of resistant hypertension, previous severe acute respiratory syndrome coronavirus 2 infection, and alcohol abuse presented to the hospital after cardiac arrest. He was taken to the catheterization lab upon arrival and was found to have an unremarkable coronary angiogram. After angiography, computerized tomography (CT) head was performed revealing an acute, large-volume, subarachnoid hemorrhage. Subsequent CT angiogram of the head confirmed this with source noted to be a ruptured aneurysm of the anterior communicating artery. ST depression on ECG has been reported in patients who have suffered a subarachnoid hemorrhage. Although the most common etiology of cardiac arrest is an acute coronary syndrome, other etiologies based on a patient's past medical history need to remain in the differential. Recognition of ECG changes may lead to earlier diagnosis and decreased mortality in subarachnoid patients.